

WHAT IS CLAIMED IS:

1. A telescopic shaft for vehicle steering that is assembled into a steering shaft for a vehicle and has a female shaft and a male shaft that are fitted
5 relatively unrotatably but slidably, the telescopic shaft for vehicle steering comprising:

torque transmitting portions that are respectively disposed on an outer surface of the male shaft and on an inner surface of the female shaft and
10 come in contact with each other for transmitting torque upon rotation; and

a preload portion composed of a rolling member that is disposed between the outer surface of the male shaft and the inner surface of the female shaft
15 at a different position from a position where the torque transmitting portions are located and rolls when the male shaft and the female shaft relatively move in the axial direction and an elastic member that is disposed adjacent to the rolling member in
20 the diametral direction and gives pressure upon the male shaft and the female shaft through the rolling member,

wherein when a gap in the torque transmitting portions is converted into a rotation angle A and a
25 possible flexural amount of the elastic member in the preload portion is converted into a rotation angle B,

the rotation angle A should be less than the

rotation angle B upon transmitting no torque.

2. The telescopic shaft for vehicle steering according to claim 1, wherein the rotation angle A at
5 the torque transmitting portions is set from 0.01 degrees to 0.25 degrees.

3. The telescopic shaft for vehicle steering according to claim 1, wherein the torque transmitting
10 portions are composed of a projection elongated in the axial direction and having a substantially arc sectional shape formed on the outer surface of the male shaft and a groove elongated in the axial direction and having a substantially arc sectional
15 shape formed on the inner surface of the female shaft.

4. The telescopic shaft for vehicle steering according to claim 1, wherein the torque transmitting portions do not come in contact with each other
20 continuously in the axial direction upon transmitting no torque.

5. The telescopic shaft for vehicle steering according to claim 1, wherein the torque transmitting
25 portions are composed of a spline-fitting structure or a serration-fitting structure formed on the outer surface of the male shaft and the inner surface of

the female shaft.

6. The telescopic shaft for vehicle steering according to claim 1, wherein the preload portion has
5 a first axial groove disposed on the outer surface of the male shaft and a second axial groove disposed on the inner surface of the female shaft opposite to the first axial groove, and the rolling member and the elastic member are disposed between the first axial
10 groove and the second axial groove.

7. The telescopic shaft for vehicle steering according to claim 1, wherein a plurality of preload portions are disposed between the male shaft and the
15 female shaft, and the plurality of transmitting portions are disposed between adjacent preload portions.

8. The telescopic shaft for vehicle steering
20 according to claim 7, wherein the preload portions are disposed in the circumferential direction with an interval of 180 degrees having the torque transmitting portions in-between.

25 9. The telescopic shaft for vehicle steering according to claim 7, wherein the preload portions are disposed in the circumferential direction with an

interval of 120 degrees having the torque transmitting portions in-between.

10. The telescopic shaft for vehicle steering
5 according to claim 9, wherein the torque transmitting portions are disposed at the center in the circumferential direction between the preload portions.

10 11. The telescopic shaft for vehicle steering according to claim 1, wherein the rolling member may include at least one spherical body.

12. The telescopic shaft for vehicle steering
15 according to claim 1, wherein the elastic member is composed of a leaf spring.

13. The telescopic shaft for vehicle steering
according to claim 1, wherein a solid lubricant film
20 is formed on the outer surface of the male shaft or the inner surface of the female shaft.